

February 12, 2007

PG&E Letter DCL-07-015

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Docket No. 50-323, OL-DPR-82
Diablo Canyon Unit 2
Licensee Event Report 2-2006-004-00
Automatic Reactor Trip due to Circulating Water Pump Surge Capacitor Failure

Dear Commissioners and Staff:

In accordance with 10 CFR 50.73 (a)(2)(iv) Pacific Gas and Electric Company is submitting the enclosed Licensee Event Report regarding an automatic reactor trip due to circulating water pump surge capacitor failure.

In accordance with 10 CFR 50.72(a)(1)(i), Emergency Declared, 50.72 (b)(2)(iv)(B), Reactor Protection System Actuation while critical, and 50.72 (b)(3)(iv)(A), Actuation of the Auxiliary Feedwater System, an Emergency Notification System report was made as Event Number 43047.

This event did not adversely affect the health and safety of the public. There are no new or revised regulatory commitments in this report.

Sincerely,

James R. Becker

ddm/2246/A0684385

Enclosure

cc/enc: Terry W. Jackson, NRC Senior Resident Inspector
Bruce S. Mallett, NRC Region IV
Alan B. Wang, NRR Project Manager
Diablo Distribution
INPO

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Diablo Canyon Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 2 3	PAGE (3) 1 OF 5
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TITLE (4)
Automatic Reactor Trip due to Circulating Water Pump Surge Capacitor Failure

EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)			
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MO	DAY	YEAR	FACILITY NAME		DOCKET NUMBER		
12	12	2006	2006	- 0 0 4 -	0 0	02	12	2007			0 5 0 0 0 0 0 0		

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11) <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">X</div> <div style="text-align: center;">10 CFR 50.73 (a)(2)(iv)(A)</div> </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">X</div> <div style="text-align: center;">10 CFR 50.73 (a)(2)(iv)(B)</div> </div> <div style="text-align: center; font-size: small;">(SPECIFY IN ABSTRACT BELOW AND IN TEXT, NRC FORM 366A)</div>		
POWER LEVEL (10)			
1 0 0			

LICENSEE CONTACT FOR THIS LER (12)	
Lawrence M. Parker - Senior Regulatory Services Engineer	TELEPHONE NUMBER AREA CODE: 805 NUMBER: 545-3386

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	K E	 C A P	7 6 0 A						

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)		MON	DAY	YR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)		<input checked="" type="checkbox"/> NO				

ABSTRACT (Limit to 1400 spaces. i.e., approximately 15 single-spaced typewritten lines.) (16)

On December 12, 2006, at 1322 PST, with Unit 2 at approximately 25 percent power, an electrical failure occurred in the circulating water pump (CWP) motor enclosure for CWP 2-1. An Emergency Notification System (ENS) Notice of Unusual Event (NUE), Number 23, Confirmed Explosion Onsite, was reported in accordance with 10 CFR 50.72 (a)(1)(i) at 1359 PST. The NUE was terminated at 1430 PST following confirmation that the initial report was due to a CWP 2-1 electrical discharge and fire, that was extinguished.

On December 12, 2006, at 1541 PST, ENS Event Number 43047 was updated to include a 4-hour report in accordance with 10 CFR 50.72 (b)(2)(iv)(B) due to a Reactor Protection System actuation while critical, and an 8-hour notification in accordance with 10 CFR 50.72 (b)(3)(iv)(A) due to the actuation of the auxiliary feedwater system. All equipment responded as designed.

The CWP 2-1 surge capacitor was replaced and the associated electrical system was repaired. The cause of the failure was a single random failure of the surge capacitor. Corrective actions will include replacing the 12kV three phase surge capacitors with more reliable single phase surge capacitors and enhancing the preventive maintenance program.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)								LER NUMBER (6)						PAGE (3)		
									YEAR	SEQUENTIAL NUMBER				REVISION NUMBER			
Diablo Canyon Unit 2	0	5	0	0	0	3	2	3	2006	-	0	0	4	-	0	0	2 OF 5

TEXT

I. Plant Conditions

Pacific Gas and Electric Company (PG&E) Unit 2 was in Mode 1 (Power Operation) at approximately 25 percent reactor power prior to the event.

II. Description of Problem

A. Background

The circulating water system [KE] provides a continuous ocean water cooling supply to the main condenser [COND], condensate cooler [CLR], service water cooling system [KG], and intake cooling system [KE]. Each unit has two single-stage circulating water pumps (CWP). The CWPs are nominal 12kV motors with local surge capacitors installed to modify steep fronted electrical waves and prevent damage to the turn-to-turn insulation of the motor. The locally mounted surge capacitors are routinely inspected each refueling outage. The surge capacitors are replaced only when found damaged or leaking.

Each unit has two non-vital 12kV Buses. Non-vital Bus D provides power to CWP 2-1 and Reactor Coolant Pumps (RCPs) 2-2 and 2-4. A reactor trip signal is initiated upon opening of any 2 of 4 RCP motor breakers.

B. Event Description

On December 12, 2006, at 1322 PST, while conducting power ascension operations with Unit 2 at approximately 25 percent power, an electrical failure occurred in the circulating water pump (CWP 2-1) 12 kV motor enclosure. A loud bang and explosion was reported to licensed plant operators in the Unit 2 control room. The electrical transient experienced on the 12 kV non-vital bus D actuated an undervoltage protection relay tripping the load breakers for CWP 2-1, as well as RCP 2-2 and RCP 2-4. The reactor trip signal was initiated when 2 out of 4 RCP motor breakers opened. All control rods fully inserted in response to the reactor trip and all plant systems functioned as required. The auxiliary feedwater system for Unit 2 was manually actuated per plant procedures, before an auto-start signal for this system was generated.

On December 12, 2006, at 1340 PST, licensed plant operators declared a Notice of Unusual Event (NUE), Number 23, Confirmed Explosion Onsite.

On December 12, 2006, at 1356 PST, the Diablo Canyon Power Plant (DCPP) Fire Department first responders reported that the fire was out.

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Diablo Canyon Unit 2	0	5	0	0	0	3	2	3	2006	-	0	0	4	-	0	0	3 OF 5

TEXT

On December 12, 2006, at 1359 PST, an Emergency Notification System (ENS) report was made in accordance with 10 CFR 50.72 (a)(1)(i) as Event Number (EN) 43047.

Decay heat was removed via auxiliary feedwater to the steam generators steaming to the atmospheric dump valves. Emergency power was supplied to DCPD via offsite electrical transmission system power.

On December 12, 2006, at 1430 PST, DCPD terminated the NUE following confirmation that the initial report was due to a CWP 2-1 electrical discharge and fire, which was extinguished.

On December 12, 2006, at 1541 PST, ENS EN 43047 was updated to include a 4-hour report in accordance with 10 CFR 50.72 (b)(2)(iv)(B) due to a Reactor Protection System actuation while critical, and an 8-hour notification in accordance with 10 CFR 50.72 (b)(3)(iv)(A) due to the actuation of the auxiliary feedwater system.

C. Status of Inoperable Structures, Systems, or Components that Contributed to the Event

None.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

The automatic actuations were immediately known to licensed plant operators in the control room by alarms and indications. Onsite reports by operators and security personnel provided immediate reports of CWP 2-1 condition and the DCPD Fire Department lead provided detailed information regarding the fire suppression and termination.

F. Operator Actions

Plant operators responded to alarms and indications provided in the control room, entered approved plant procedures, and initiated auxiliary feedwater prior to automatic actuation.

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									YEAR	SEQUENTIAL NUMBER				REVISION NUMBER			
Diablo Canyon Unit 2	0	5	0	0	0	3	2	3	2006	-	0	0	4	-	0	0	4 OF 5

TEXT

G. Safety System Responses

The reactor trip signal was initiated when 2 out of 4 RCP motor breakers opened. All control rods fully inserted in response to the reactor trip and all plant systems functioned as required. The auxiliary feedwater system was manually actuated per plant procedures, before an auto-start signal for this system was generated.

III. Cause of the Problem

A. Immediate Cause

The CWP 2-1 surge capacitor failed causing a phase to phase electrical short resulting in a 12kV electrical discharge and localized fire.

B. Root Cause

The root cause of the surge capacitor phase-to-phase internal fault was an inservice insulation breakdown, a single random electrical failure. No adverse industry or site surge capacitor failure trend was identified.

C. Contributing Causes

An engineering replacement part evaluation issued in 1993 allowed the use of a single three phase capacitor in lieu of the more reliable single phase capacitors. Also, the surge capacitor maintenance program was inadequate to ensure replacement consistent with testing or industry data.

IV. Assessment of Safety Consequences

There were no actual safety consequences involved in this event since the nonsafety-related plant electrical systems responded as designed automatically terminating the 12kV power to the fault. All safety-related systems responded as designed by tripping the reactor and would have automatically started the auxiliary feedwater pumps, in the event the licensed plant operators did not manually initiate them via approved plant procedures.

Final Safety Analysis Report (FSAR) Update, Section 15.2.9, Loss of Offsite Power to the Station Auxiliaries, previously analyzed the total loss of offsite power, and bounds the partial loss of forced circulation experienced in this event. The FSAR Update concluded that "for the loss of offsite power to station auxiliaries event, all safety criteria are met."

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Diablo Canyon Unit 2	0	5	0	0	0	3	2	3	2006	-	0	0	4	-	0	0	5 OF 5

TEXT

This condition is not considered a Safety System Functional Failure as the loss of one of two nonsafety-related CWPs is a previously analyzed transient that does not create a significant condition adverse to safety.

Therefore, the event is not considered risk significant, and it did not adversely affect the health and safety of the public.

V. Corrective Actions

A. Immediate Corrective Actions

The CWP 2-1 surge capacitor was replaced and the associated electrical system was repaired.

B. Corrective Actions

PG&E will replace the 12kV three phase surge capacitors with more reliable single phase surge capacitors.

PG&E will enhance the surge capacitor preventive maintenance program to include periodic replacement of the 12kV and 4kV surge capacitors based upon testing and/or industry data.

VI. Additional Information

A. Component:

The component is an ABB 3-phase 13.8 kV Capacitor, Part# ESG3180A39, and was last replaced in 1996.

B. Previous Similar Events

None.

OUTGOING CORRESPONDENCE SCREEN

(Remove prior to NRC submittal)

Document: PG&E Letter DCL-07-015

Subject: Automatic Reactor Trip due to Circulating Water Pump Surge Capacitor Failure

File Location S:\RS\RA\LER\2007\DCL07015.DOC

FSAR Update Review

Utilizing the guidance in XI3.ID2, does the FSAR Update need to be revised? Yes ☐ No ☒
If "Yes", submit an FSAR Update Change Request in accordance with XI3.ID2 (or if this is an LAR, process in accordance with WG-9)

Commitment #1:

Statement of Commitment: PG&E will replace the 12kV three phase surge capacitors with more reliable single phase surge capacitors.

Clarification: There are no new commitments contained in this letter.

	AR or NCR	AE or ACT
Tracking Document:	N0002214	Act 19 and 20
Assigned To:	NAME	ORGANIZATION CODE
Commitment Type:	FIRM OR TARGET T	DUE DATE:
Outage Commitment?	YES OR NO No	IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)
PCD Commitment?	YES OR NO No	IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)
Duplicate of New NCR Commitment in PCD?	YES OR NO No	IF YES, LIST PCD NUMBER (e.g., T35905, etc.)
Old PCD Commitment being changed?	YES OR NO No	IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED

Commitment #2

Statement of Commitment: PG&E will enhance the surge capacitor preventive maintenance program to include periodic replacement of the 12kV and 4kV surge capacitors based upon testing and/or industry data.

Clarification: There are no new commitments contained in this letter.

	AR or NCR	AE or ACT
Tracking Document:	N0002214	Act 21 and 25
Assigned To:	NAME	ORGANIZATION CODE
Commitment Type:	FIRM OR TARGET	DUE DATE:
Outage Commitment?	YES OR NO	IF YES, WHICH? (E.G., 2R9, 1R10, ETC.)
PCD Commitment?	YES OR NO	IF YES, LIST THE IMPLEMENTING DOCUMENTS (IF KNOWN)
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Old PCD Commitment being changed?	YES OR NO	IF YES, LIST PCD NUMBER, AND CLARIFY TO CLERICAL HOW COMMITMENT TO BE REVISED